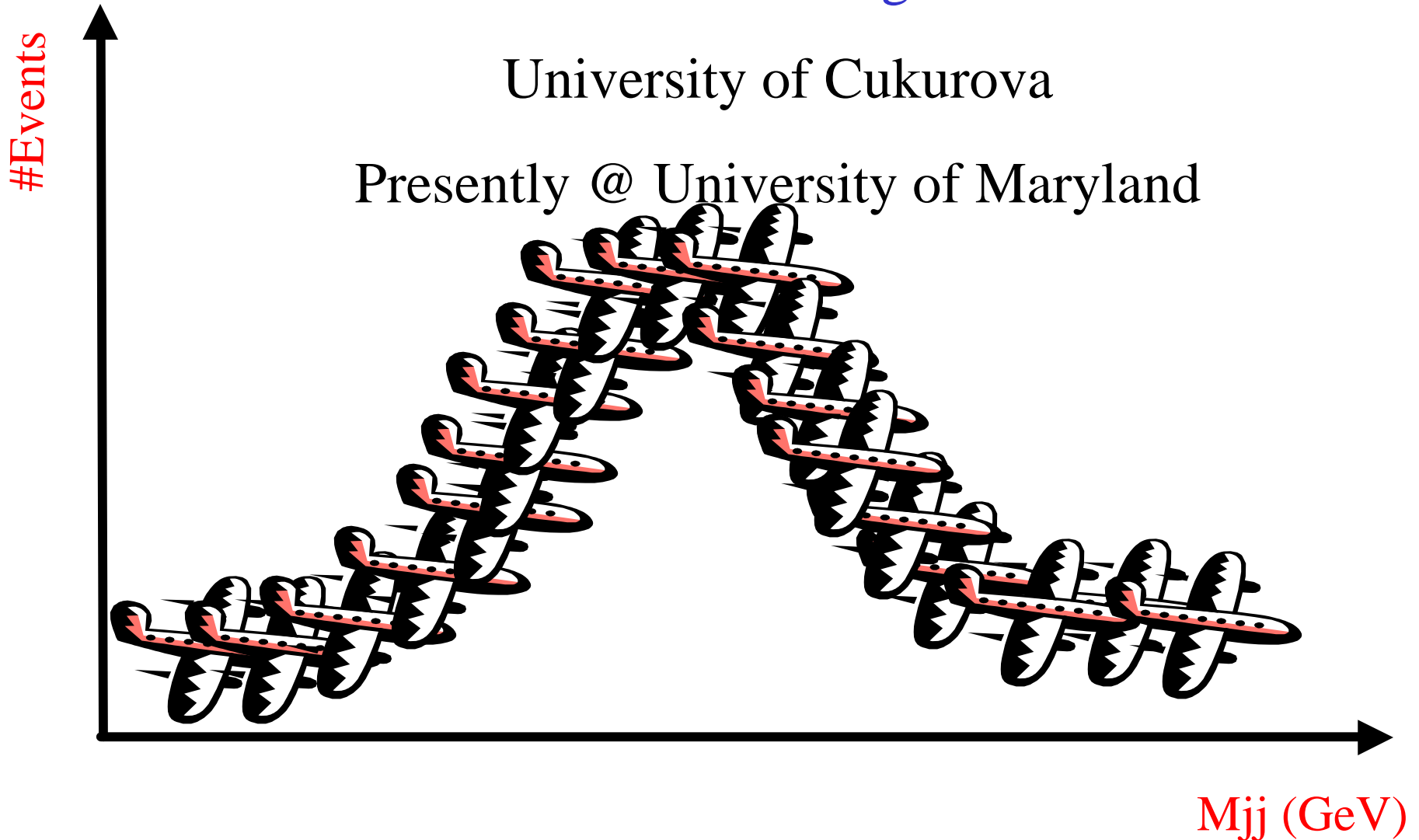# PRELIMINARY RESULTS FOR DIJET RESONANCES

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CONTENTS

- Goals.
- Data samples for signal and QCD (background).
- QCD cross section.
- Total cross sections in mass window.
- Estimated Luminosities for 5σ discovery.
- Conclusion & Future Plans.

GOALS

- Calculate the QCD (background) and signal cross sections.

- Estimate required luminosity for %50 probability for discovery of exotic particles.

- Investigate the how much bandwidth we need to discover exotic particles during CMS lifetime.

# DATA SAMPLES FOR SIGNAL & QCD BACKGROUND

- Events were generated using Pythia 6.158
- Study is done at generator level
    - Use cone jet clustering algorithm on generator particles, cone 0.5,
    - Smear jets with sigma=1.0 sqrt(E_T).
- QCD bins used for analysis : 20-30, 30-50, 50-80, 80-120, 120-170, 170-230, 230-300, 300-400, 400-500, 500-600, 600-800, 800-1000, 1000-1400, 1400-1800,1800-2200, 2200-2600, 2600-3000, 3000-3500, 3500-4000 .
- 15 K event was generated for each bin.
- 10 K Z' events were used as a signal.
- Generated particle (Z') masses: 100, 200, 250, 300, 350, 400, 600, 800, 1000, 1200, 1400, 1600, 1800, 2000, 2200, 2400, 2600, 2800, 3000.

QCD CROSS SECTION
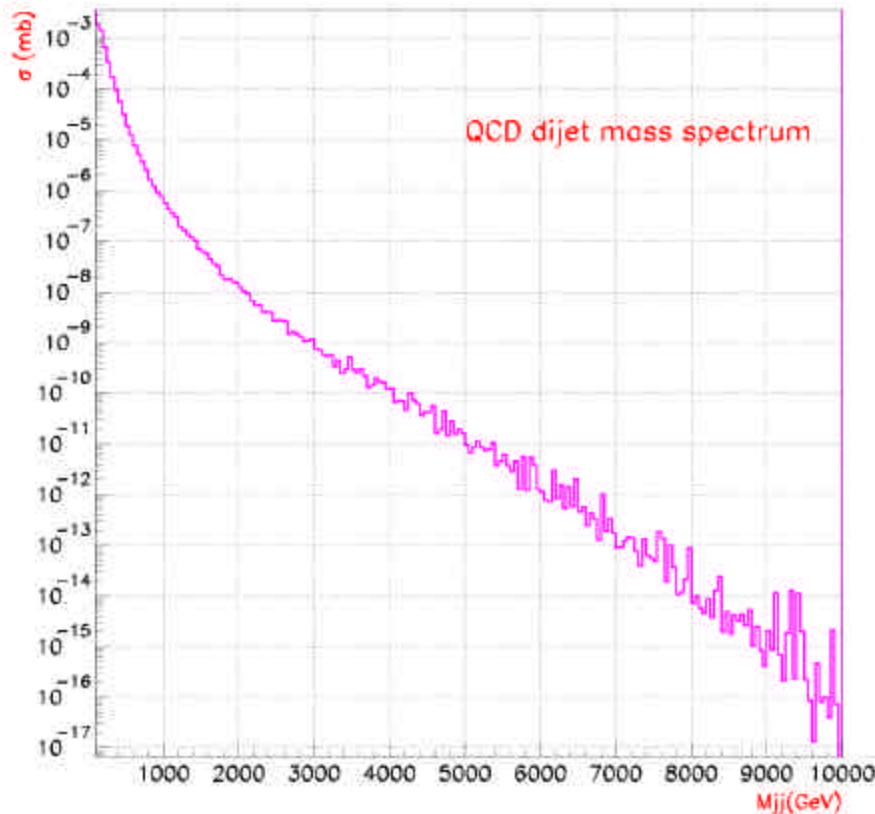
- QCD cross section calculated using 15 K event for each bin.
- Two leading jet used for calculating Mjj.
- Two jet invariant mass calculated using :

  $Mjj=2E_{T1}E_{T2}(Cosh\Delta\eta-Cos\Delta\phi)$.

- $E_T^{jet} > 50$ GeV & $\eta^{jet} \leq 2$ cuts were applied for both leading jets.
- Tevatron analyses also cut on $cos(\theta*)$. Will investigate this later…

TOTAL CROSSECTION IN MASS WINDOW
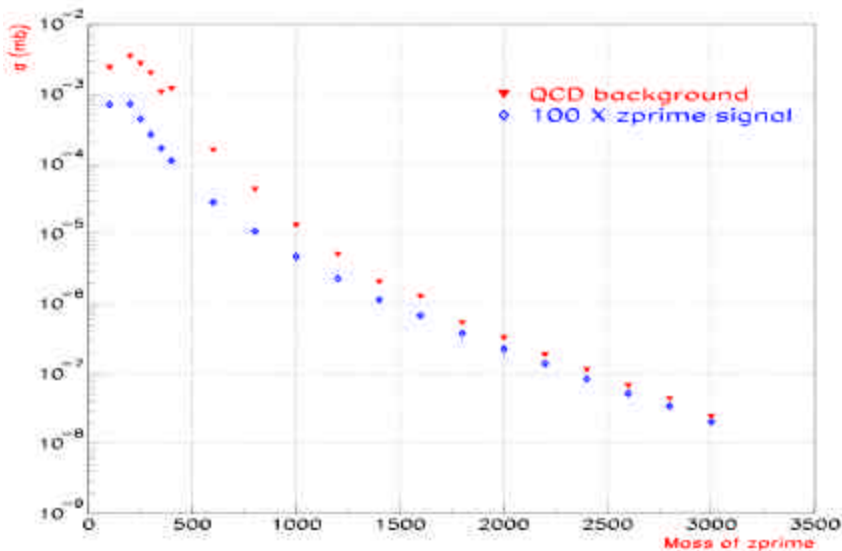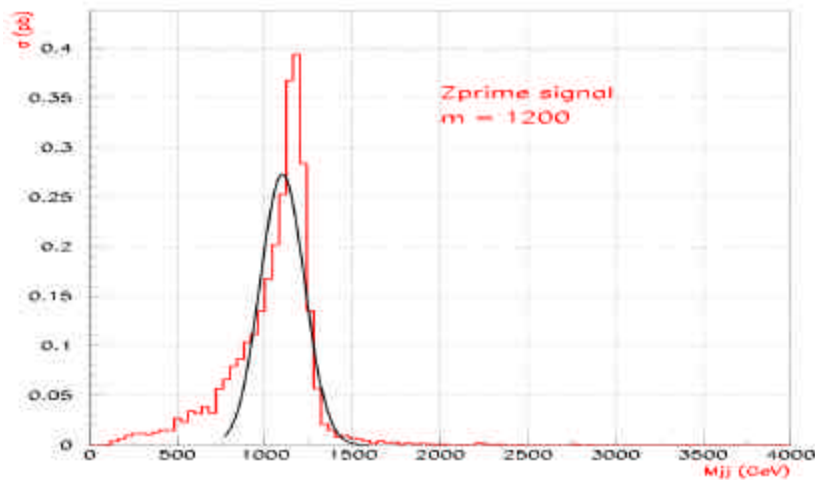
- Signal fitted with gaussian around pick.

- Total cross sections were calculated within $\pm 2\sigma$ mass window for both signal and QCD background.

- $1000*\ \sigma_{signal}$ compared to $\sigma_{QCD.}$ Signal Cross section seems to decrease almost the same amount below Mjj=1000 with increasing Mjj. And difference becomes less at higher energies.

ESTIMATED LUMINOSITIES FOR 5σ DISCOVERY
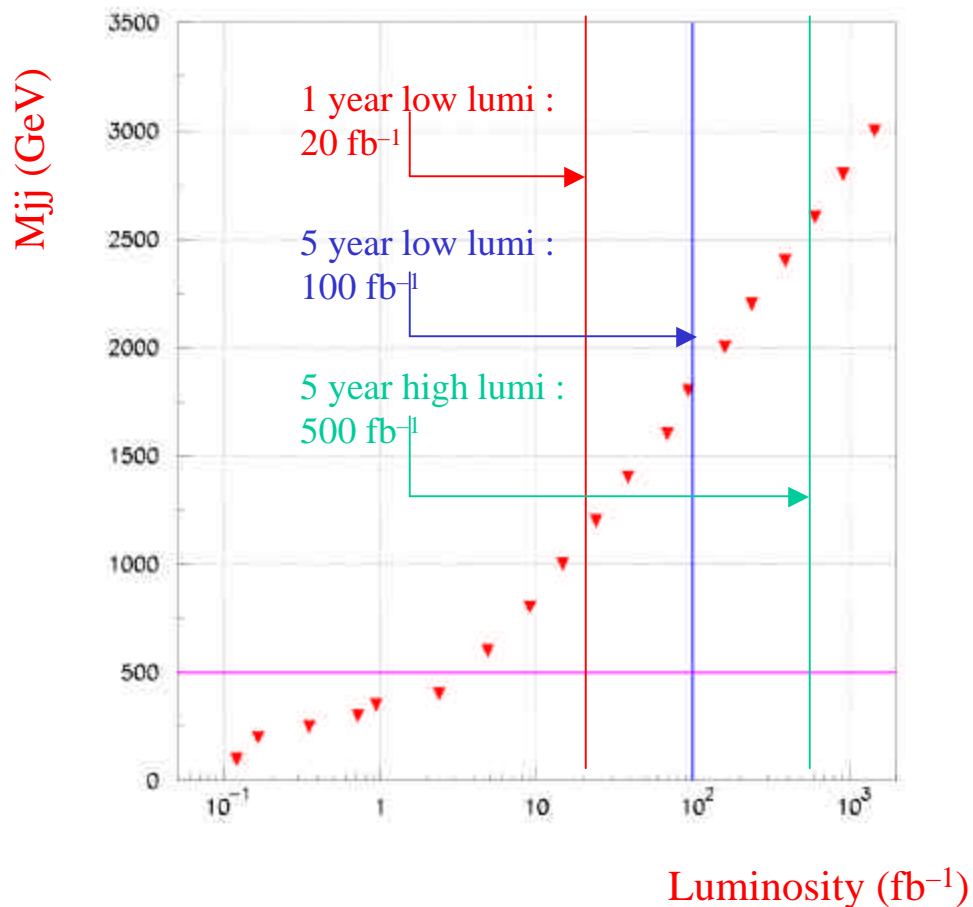
- Luminosities are given for 5σ discovery.

- Calculated using :

  $$L = 25 \, \sigma_{QCD}^{\;window} / \sigma^2_{signal}^{\;window}$$

- Vertical lines shows 1, 5 year low luminosity & 5 year high luminosity.

- Horizontal line shows the CDF limit for dielectron channel.

CONCLUSIONS&FUTURE PLANS

- Present studies were done using E_T cut of 50 GeV. It is not realistic. We need to understand how much reasonable prescales affect this.

- We plan to run again for different particles (W', diquarks, etc.).

- We should investigate how NLO will effect this results.

- Check the result for full ORCA.